UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,469	08/16/2001	Rajiv Laroia	Flarion-21	2998

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EXAMINER
NGUYEN, STEVEN H D

ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	09/931,469	LAROIA ET AL.
Office Action Summary	Examiner	Art Unit
	Steven HD Nguyen	2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>06 March 2006</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2.   Claims 1-2, 10, 14-15, 20-27 and 30-37 are rejected under 35 U.S.C. 102(b) as being

anticipated by Shattil (WO 9941871).

Regarding claims 1 and 36-37, Shattil discloses a method of processing a frequency

division multiplexed signal being OFDM (page 4, line 31-34) representing a plurality of symbols

and including a plurality of tones, a first subset of said plurality of tones being allocated to a first

user (page 7, lines 27-29 and page 12, lines 23-28) comprising the steps of performing a time

domain to frequency domain transform operation on the frequency division multiplexed signal to

generate a frequency domain signal there from (page 7, lines 4-6); filtering the frequency domain

signal to remove tones that allocated to a second users in said plurality of tones which are not

included in said first subset of tones that allocated to the first user (Fig 7, Ref 56 is a filter);

performing a frequency domain to time domain transform operation on the filtered frequency

domain signal to generate a filtered time domain signal (Fig 4, page 6, lines 1-10, page 12, lines

12-14) and recovering symbols transmitted to the first user from the filtered time domain signal

(Fig 7, Ref 66, page 7, lines 10-13 and page 12, lines 12-14).

Regarding claim 2, Shattil discloses performing a channel equalization operation on the filtered time domain signal (page 7, lines 6-13, page 8, line 30-40 and Fig 7).

Regarding claims 10 and 27, Shattil discloses the frequency division multiplexed signal is an orthogonal frequency division multiplexed signal (page 4, lines 31-34); recovering symbols transmitted to the first user includes mapping values of the filtered time domain signal at instants in time used to transmit symbol values to values in a set of symbol values (Fig 7, Page 7, lines 3-23 adapted to estimate information symbols impressed on received pulses which are centered at equally spaced instants in time used to transmitted symbol values).

Regarding claims 14, Shattil discloses an apparatus for processing a frequency division multiplexed signal representing a plurality of symbols and including a plurality tones, a first subset of said plurality of tones being allocated to a first user (Page 7, lines 27-29 and page 12, lines 23-28), the apparatus comprising a time to frequency domain transform module for generating a frequency domain signal from the frequency division multiplexed signal (page 7, lines 4-6); a tone filter (Fig 7, Ref 56) for filtering from the frequency domain signal generated by the time domain to frequency domain transform module tones other than those included in the first subset to thereby generate a filtered frequency domain signal; a frequency to time domain transform module (Fig 4, page 6, lines 1-10, page 12, lines 12-14) for performing a frequency domain to time domain transform operation on the filtered frequency domain signal to thereby generate a time domain signal; a time instant to symbol mapping module coupled to the frequency to time domain transform module for mapping signal values at points in time to symbol values (Fig 7, Ref 60mn, 64m, 66, page 7, lines 8-13, page 12, lines 12-14, page 15, lines 12-16).

Regarding claim 15, Shattil discloses a channel equalization module coupling said frequency to time domain transform module to the time instant to symbol mapping module, the channel equalization module performing channel equalization operations on said time domain signal (page 7, lines 6-13, page 8, line 30-40 and Fig 7).).

Regarding claims 20 and 22, Shattil discloses a method of processing a received orthogonal frequency division multiplexed signal to generate symbol values (Page 4, lines 31-34), the method comprising performing a channel equalization operation on the received OFDM signal in the time domain (Page 7, line 6-7); and mapping values of the OFDM signal after channel equalization at instants in time used to transmit symbol values to symbol values (Fig 4, 12b and page 7, lines 8-13).

Regarding claim 21, Shattil discloses filtering (Page 6, lines 4-6, Fig 7, Ref 56) the OFDM signal in the frequency domain to remove undesired signal tones on the received signal in the time domain prior to performing said channel equalization operation (Page 7, lines 27-29),

Regarding claim 23, Shattil discloses a time to frequency domain transformer (Page 7, lines 4-6, tone filter (Fig 7, Ref 56) for filtering the received OFDM signal in the frequency domain and frequency to time domain transformer for transforming the filtered OFDM signal in time domain to frequency domain (Page 6, lines 1-10 and page 12, lines 12-14) and channel equalization (page 7, lines 6-13, page 8, line 30-40 and Fig 7).

Regarding claim 24, Shattil discloses a communications system comprising an orthogonal frequency division multiplexed signal transmitter (Fig 1 and 2, page 4, line 31-34) including a symbol to time instant mapping module (page 4, line 25 to page 6, line 12 and page 12, line 3-28) for mapping a plurality of symbols to be transmitted to uniformly spaced points in time

within a time period corresponding to a symbol duration; and an orthogonal frequency division

multiplexed signal receiver (Fig 7) including: a time instant to symbol mapping module (page 7,

lines 3-14) for mapping signal values at points in time used to transmit symbols to symbol

values.

Regarding claim 25, Shattil discloses a time to frequency domain transformer (Page 7,

lines 4-6, tone filter (Fig 7, Ref 56) for filtering the received OFDM signal in the frequency

domain and frequency to time domain transformer for transforming the filtered OFDM signal in

time domain to frequency domain (Page 6, lines 1-10 and page 12, lines 12-14)

Regarding claim 26, Shattil discloses a time domain channel circuit (page 7, lines 6-13,

page 8, line 30-40 and Fig 7).

Regarding claims 30 and 34-35, Shattil discloses recovering multiple symbol values from

the filtered time domain signal includes recovering a plurality of symbol values from a portion of

said filtered time domain signal corresponding to a single OFDM symbol transmission time

period, each symbol value corresponding to a different point in time within the single OFDM

symbol transmission time period (page 7, lines 10-13 and page 12, lines 12-14).

Regarding claim 31, Shattil discloses different points in time within the symbol

transmission time period from which individual symbol values are generated are uniformly

spaced in time within the single OFDM symbol transmission time period (Fig 7, Ref 66, page 7,

lines 10-13 and page 12, lines 12-14).

Regarding claim 32, Shattil discloses time instant to symbol mapping module is a time

domain signal processing module which maps each one of multiple individual time instants

within an OFDM symbol time period to corresponding individual symbol values according to a

one to one relationship between time instants and symbol values (Fig 7, Ref 66, page 7, lines 10-

13 and page 12, lines 12-14).

Regarding claim 33, Shattil discloses mapping of values of the OFDM signal after

channel equalization involves performing said mapping of values in the time domain, said

mapping including mapping of a plurality of individual instants in time within an OFDM symbol

period to generate a corresponding plurality of symbol values, each of the plurality of symbol

values corresponding to a single time instant (Fig 4, 12B and page 7, lines 8-13).

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Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

4.   Claims 3-9, 11-13, 16-19 and 28-29 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Shattil in view Blanchard (USP 5612978).

Regarding claims 3-9, Shattil fails to disclose recovering symbols further includes

performing a channel estimation operation, said channel estimation operation including

identifying a training symbol in the filtered time domain signal; generating at least one channel

estimation as a function of the difference between the identified training symbol and a known

training symbol value; each dwell includes training symbols which is located in the middle of

dwell and performing equalization without mid amble. However, the examiner takes an official

notices that a method and system for estimating channel characteristic based on the different

between known; identified training symbol and each dwell includes training symbols which is located in the middle of dwell and performing equalization without mid amble are well known and expected in the art at the time of invention was made in order to implement this method into the teaching of Shattil. The motivation would have been to provide a quality signal by reducing the interference.

Regarding claims 11 and 28, Shattil fails to disclose recovering symbols transmitted to the first user further includes performing a symbol value to symbol value mapping operation to map symbol values generated by mapping values of the filtered time domain signal to values in another set of symbol values. However, the examiner takes an official notices that a method and system for performing a symbol value to symbol value mapping operation to map symbol values generated by mapping values of the filtered time domain signal to values in another set of symbol values symbol is well known and expected in the art at the time of invention was made in order to implement this method into the teaching of Shattil. The motivation would have been to obtain a quality level by performing mapping between modulated symbol levels with symbol values.

Regarding claims 12, Shattil fails to disclose performing a time domain to frequency

domain transform operation includes performing one of a Fast Fourier Transform operation and a

Discrete Fourier Transform operation; performing a frequency domain to time domain transform

operation includes performing one of an Inverse Fast Fourier Transform operation and an Inverse

Discrete Cosine Transform operation. However, Shattil fail to disclose a receiver, which

includes FFT and IFFT. In the same field of endeavor, Blanchard discloses a receiver includes a

FFT, filter and IFFT (Fig 1, Ref 24).

Since, FFT and IFFT are well known in the art for using to transform time to frequency

and frequency to time. Therefore, it would have been obvious to one of ordinary skill in the art

to implement FFT and IFFT into the teaching of Shattil and Vijayan. The motivation would

have been to obtain a quality signal.

Regarding claim 13, Shattil discloses receiving FDM signals corresponding to users other

than first user (Page 7, lines 27-29, page 8, lines 20-25, page 12, lines 3-14 and 23-28).

Regarding claims 16-18, Shattil fails to fully disclose a channel estimation circuit

coupled to said frequency to time domain transform module and to the channel equalization

module for generating at least one channel estimate from the time domain signal and for

supplying the channel estimate to the channel equalization module, a symbol to symbol mapping

module and a cyclic prefix discarding circuit coupled to the time to frequency domain transform

module for discarding portions of the frequency division multiplexed signal corresponding to

cyclic prefixes. However, the examiner takes an official notices that a channel estimation, a

symbol to symbol mapping module a cyclic prefix discarding circuit are well known and

expected in the art at the time of invention was made to implement a channel estimation circuit

and a symbol to symbol mapping module into the teaching of Shattil. The motivation would have been to provide a quality signal by reducing the interference.

Regarding claim 19, Shattil fails to discloses the time to frequency domain transform module is a Fast Fourier Transform circuit; and wherein the frequency to time domain transform module is an inverse Fast Fourier Transform circuit. In the same field of endeavor, Blanchard discloses a receiver includes a FFT, filter and IFFT (Fig 1, Ref 24).

Since, FFT and IFFT are well known in the art for using to transform time to frequency and frequency to time. Therefore, it would have been obvious to one of ordinary skill in the art to implement FFT and IFFT as disclosed by Blanchard into the teaching of Shattil. The motivation would have been to obtain a quality signal.

Regarding claim 28, Shattil discloses the value of the filtered time domain signal at a single instant in time is used to generate one symbol value (page 7, lines 8-10 and page 15, lines 12-16).

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
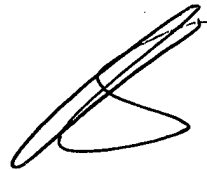
Shattil (USP 7010048) discloses a multiple access method and system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven HD Nguyen whose telephone number is (571) 272-3159. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Wellington Chin can be reached on (571) 272-3134. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Steven HD Nguyen
Primary Examiner
Art Unit 2616
May 11, 2006